

PHOTON AND WATER MEDIATED SULFUR OXIDE AND ACID CHEMISTRY IN THE ATMOSPHERE OF VENUS

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Sulfur compounds have been observed in the atmospheres of a number of planetary bodies in our solar system including Venus, Earth, Mars, Io, Europa, and Callisto. The global cloud cover on Venus located at an altitude between 50 and 80 kilometers is composed primarily of sulfuric acid (H_2SO_4) and water. Planetary photochemical models have attempted to explain observations of sulfuric acid and sulfur oxides with significant discrepancies remaining between models and observation. In particular, high SO_2 mixing ratios are observed above 90 km which exceed model predictions by orders of magnitude. Work recently done in the Vaida lab has shown red light can drive photochemistry through overtone pumping for acids like H_2SO_4 and has been successful in explaining much of the sulfur chemistry in Earth's atmosphere. Water can have a number of interesting effects such as catalysis, suppression, and anti-catalysis of thermal and photochemical processes. We investigate the role of water complexes in the hydration of sulfur oxides and dehydration of sulfur acids and present spectroscopic studies to document such effects. We investigate these reactions using FTIR and UV/Vis spectroscopy and will report on our findings.